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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,890	08/16/2000	Seiji Shirai	P19797	6628
7055 7590 11/19/2003				
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1950 ROLAND CLARKE PLACE				
RESTON, VA 20191				
EXAMINER				
DINH, TUAN T				
ART UNIT		PAPER NUMBER		
2827				

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/600,890

Applicant(s)

SHIRAI ET AL.

Examiner

Tuan T Dinh

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-12,14-19 and 21-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-12,14-19 and 21-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

### DETAILED ACTION

Claims 1-3, 5-12, 14-19, and 21-36 are pending in this application.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 11 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 11, lines 2-3, it is confuse. The phrase of "a depression is formed on a central surface portion of the plating layer surface extending out of the through hole" is repeated from the step of claim 9. Does applicant refer another "a depression...through hole"?

Note of the claim language

#### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 6-11, 15-18, 22-25, 27-28, 30, and 32-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Uno et al. (U. S. Patent 5,827,604, hereafter Uno).

As to claims 1-2, 8-10, and best understood of claim 11, Uno discloses a multilayer printed wiring board (1, column 5, lines 18-19) and also shown in figures 1-8 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another,

the interlaminar insulative resin layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3), which is roughened surface, substantially filled up with a plating layer (6, column 13, lines 8-9) having a substantially flat surface (see figure 5) to form a viahole having a diameter (100  $\mu\text{m}$ ), wherein

the surface of said plating layer (6) extending out of the through hole and lying in a substantially same level as the surface of the conductor circuit layer (see figure 5) disposed in the interlaminar insulative resin layer (4) in which the plating layer (6) also lies;

at least one of the surface of the conductor circuits (3) is roughened (uneven layer is a roughened layer (9) as a roughened surface of a conductor layer 3-see figure 1) to a depth of 1 to 10  $\mu\text{m}$  (column 3, lines 42-44, column 7, lines 8-29); wherein depressions are formed (examiner assumes the final product has been already made

the plating layer that formed into the through hole) on a central surface portion of the plating layer surface extending out of the through hole, and

the thickness of said conductor circuit layer is less than 25  $\mu\text{m}$  or less than a half of the viahole (11) diameter (viahole 11 has a diameter~100  $\mu\text{m}$ ).

As to claims 17, 24, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another, the interlaminar insulative resin layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3) wherein the inner wall (4a) is roughened surface, substantially filled up with a plating layer (6, column 13, lines 8-9) to form a viahole having a diameter (100  $\mu\text{m}$ ), the thickness of the conductor layer is less than 25  $\mu\text{m}$ , wherein

said roughened inner wall (4a) is cover with a roughened electroless plating layer (9), and an inner space of said through hole (7; 11) defined by the electroless plating layer (9) and is substantially filled up with an electroplating layer (10).

As to claims 25, 27, 30, and 33, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another, the interlaminar insulative resin

layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3) wherein the inner wall (4a) is roughened surface, substantially filled up with a plating layer (6, column 13, lines 8-9) to form a viahole having a diameter (100  $\mu\text{m}$ ), the thickness of the conductor layer is less than 25  $\mu\text{m}$ , wherein

said interlaminar insulative resin layers (4) being formed from a composite of thermosetting resin and heat-resistance thermoplastic resin (see column 7).

As to claims 6, 22, Uno discloses the multiplayer wiring board disclosed in figures 1-5 wherein the interlaminar insulative resin layer is made of thermoplastic resin or a composite of thermoplastic and thermosetting resins (column 9, lines 10-14).

As to claims 7, 16, 23, 32, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 wherein a ratio between a viahole diameter (100  $\mu\text{m}$ ) and an interlaminar insulative resin layer thickness (40 or 50  $\mu\text{m}$ , column 14, lines 51-62) being within a range of 1 to 4.

As to claims 18, 28, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 wherein a depression is formed on a central surface portion of the plating layer surface (6) extending out of the through hole.

As to claims 34-36, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 wherein said roughened inner wall (4a) is cover with a roughened electroless plating layer (9), and an inner space of said through hole (7; 11) defined by the electroless plating layer (9) and is substantially filled up with an electroplating layer (10).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3, 12, 19, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uno ('604) in view of Frankeny et al. (U. S. Patent 5,509,200).

Uno discloses all of the limitations of the claimed invention, except for the plating layer surface being roughened.

Frankeny shows a plating layer (12) having a roughened surface disclosed in figures 7, 9-12.

It would have been obvious to one having a roughened surface on a plating layer as taught by Frankeny to employ the multiplayer wiring board of Uno in order to provide a reliable electrical connection, seal a boundary and bind two or more stackable layers into the multiplayer circuit board.

7. Claims 5, 14, 21, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uno ('604) in view of Kinoshita (U. S. Patent 6,127,633).

Uno discloses all of the limitations of the claimed invention, except for a further viahole formed in the viahole.

Kinoshita shows a structure of a multiplayer wiring board as shown in figures 1-6 comprising a further viahole (15a; 17a/b) is formed in a viahole (13a).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have teaching's Kinoshita employed in the multiplayer wiring board of Uno in order to provide an electrical contact of each layer of a multiplayer wiring board.

8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uno ('604) in view of Nagamatsu et al. (U. S. Patent 4,769,270).

As to claim 26, Uno discloses all of the limitations of the claimed invention, except for the insulating layer made of a composite of fluororesin fiber cloth, wherein said cloth comprises voids, and wherein thermosetting resin is impregnated in the voids in the cloth.

Nagamatsu shows the insulating layer (2) made of a composite of fluororesin fiber cloth (4, column 2, lines 41-42), wherein said cloth comprises voids (apertures 11, column 2, line 62), and wherein thermosetting resin (column 3, lines 1-4) is impregnated in the voids in the cloth.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the material (claim 26) as taught by Nagamatsu employed in the multiplayer wiring board of Uno in order to achieve high performance in a high region has been desired.



### ***Response to Arguments***

Applicant's arguments filed 09/17/03 have been fully considered but they are not persuasive.

Applicant argues:

(a) Uno fails to teach or suggest "through holes having an inner wall **substantially filled up** with a plating layer having a substantially flat surface.", and

(b) "depressions are formed on a central surface portion of the plating layer surface extending out of the through holes" They are incorrect.

Examiner disagrees.

Response to argument (a), Uno discloses a through hole (7) in figure 5 clearly having an inner wall (4a) **substantially filled up** with a plating layer (6) having a substantially flat surface.

Response to argument (b), Uno discloses the plating layer (6) in final product of figure 5 that the plating layer (6) has been depressed in form to bent into the through hole and extending out of the through hole and formed on a surface of the inner wall.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

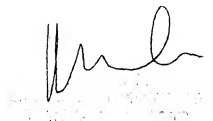
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T Dinh whose telephone number is 703-306-5856. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 703-308-1233. The fax phone number for the organization where this application or proceeding is assigned is 703-305-1341.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0658.

Tuan Dinh  
November 12, 2003.

A handwritten signature in black ink, appearing to read 'Tuan Dinh', is positioned above a faint, rectangular official stamp. The signature is fluid and cursive.